Division of Marketing
Agricultural Development and Diversification (ADD) Program

1991 Grant Final Report

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FINAL REPORT
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STATE OF WISCONSIN AGRICULTURAL DEVELOPMENT
AND DIVERSIFICATION GRANT #6040

PROJECT TITLE:
Apple and Fruit Butters from Apple Pomace

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NOTE: This final report will be followed by an addendum report after the 1992 fresh apple season is completed. The reason for submitting an additional report is that we have not had the benefit of working through a complete fresh apple season for an accurate analysis of costs and markets. Almost all of the work to date has been done with frozen pomace from last season's crop.

INTRODUCTION

The objective for seeking ~~the~~ this grant, thus the objective for the grant itself, was to make an economic use of the apple after it is pressed into apple cider. Making cider involves the grading and washing of apples, grinding the whole apple into chips and the pressing the apple chips to extract the juice. At present the pressed chips, referred to as pomace, have little or no economic value for most orchards. Some orchards that press apples into cider are able to sell the pomace for animal feed, some use it as a mulch for selected applications and others simply give it away. In the Bayfield area the orchards give it to deer farms for feed. While large commercial apple juice operations may add some type of an enzyme or cellulose agent treatment to the apple chips prior to pressing to maximize juice extraction, small farm orchards do not add anything so the pomace remaining after the apples are pressed is a good quality clean apple meat. Obviously a grading standard that rejects unsuitable apples is essential for quality.

The question of apple quality is the most frequently asked question concerning the viability of this project. Anyone who has toured a large commercial apple juice processing plant is aware of the generally low apple quality used. Using the meat of the apples from this type of commercial operation would not be deemed advisable. Farm orchards must, however, use a better grade of apple since their pressing of apples into cider is different than a manufacturing process. Without a treatment process of some type the farm's apple cider is directly determined by the flavor and quality of the apples being pressed. Certainly all of the apples used are much fresher. Since being involved with this project we have increased our sorting standards and find the percentage of rejected apples is very minor. The rejection rate has never exceeded three percent and is normally around one percent.

When I applied for this grant I believed that there had to be a higher economic use for the pomace and turned to the direction of fruit butters for the simple reason of trying to obtain a high unit volume product with a meaningful established cash value. My prior knowledge of making any kind of jam, jelly or preserve was zero so the entire grant project was a total learning process for me. From making an apple butter for the initial project attempt we ended up going in a variety of directions with any number of tangent projects and ideas. The benefit of starting with zero knowledge allowed a freedom of inquiry and experiment without having any preconceived inhibitions. At the start I didn't believe this would be the case.

LIST OF BASIC EQUIPMENT ON LOCATION

This list of equipment being used should make it easier to understand the recipe and process explanations contained in this report.

- 40 gallon self-contained steam kettle with bottom draw-off
- Small pulper/finisher with various sized screens (used to eliminate seeds & core material from cooked pomace)
- Jar Filler - semi-automatic, adjustable volume with hopper
- Refractometer (used to determine percentage of solids in product during final cook. Essential to insure FDA standards and have final product consistent each batch.)
- Thermometer, 15 gallon jelly bag, large stainless stock pots and a variety of mixing utensils

MAJOR PRODUCT BEING PRODUCED

The progression of products attempted and then completed numbered more than fifty. At this time one major and seven limited production products are being produced. The major product, an apple jam, was selected for the reason that it best satisfies the original objective: All of the byproduct is used, the jam is economical to make, the process is relatively simple, and the jam has initial public acceptance.

To the best of my knowledge there isn't a commercial apple jam product on the market. The product is very similar to an Apple Fruit Butter in taste and texture. The appearance is identical. The major recipe difference is the omission of apple cider and the need for less cook time. The idea for the jam is the result of looking through old farm-home preserving recipe books. In the addendum to this report I will be able to detail marketing experience.

Product batch size is determined by the capacity of the equipment we have. With this factor in mind we have evolved the following recipe proceedure to make one batch of apple jam:
a) Thaw 210 pounds of frozen pomace and seperately collect and hold aside for later use the juice that initially forms as the pomace approaches room temperature.

b) Place the thawed pomace, the volume will be about 25 gallons, into the steam kettle with 1Ø gallons of water. Bring this to a boil while stiring occassionally, then allow to simmer for twenty minutes.
c) Run the pomace through the pulper with a .Ø66" screen to eliminate the apple seeds, core material and any skin that did not cook-up.
d) Place the pulped pomace back into the steam kettle that has been cleaned and then pour the juice previously collected, usually about 4 gallons, into the kettle. This juice has a high fructrose sugar content.
e) Bring this mix up to a boil temperature and then immediately stir in 75 pounds of sugar. We have been using cane sugar and by experiment have found that substuting brown sugar at the rate of 2Ø% for a portion of the cane sugar makes a desirable taste improvement. After the sugar is completely mixed and the product temperature again exceeds 214 degrees we have added 1.3 ounces of ground cinnamon to make the taste more interesting.
f) With occassional hand mixing the product is continously cooked at 214 degrees until the percentage of solids, as shown on the refractometer, reaches 45 percent.
g) When the proper solids percentage is reached the product is immediately put into the jars. It is important that the temperature of the product be at least 19Ø degrees when the jar is capped to avoid contamination problems. The jar is turned on its top as soon as the cap is secure and is not turned upright until cooled.

We have random selected jars of apple jam from a number of batches and mailed them to a test lab for aerobic plate, coliform, yeast/mold and Ph analyses. All results have been well within accepted industry standards.

OTHER PRODUCTS BEING PRODUCED

Cooking all of the pomace as it thaws and then placing this cooked pomace into a jelly bag results in an apple juice fairly rich in pectin. This juice by itself can be cooked to the jelling point with sugar to make an apple jelly. At one point we were making jelly from the juice of the cooked pomace and then making apple jam from the pomace solids remaining in the jelly bag. This was considered an ultimate two product use of the pomace. (10% more sugar was needed for the jam when this dual use was tried.) Taste considerations, when comparing the jam when this additional use was employed, caused us to abandon the idea. We have so much pomace available that the economic gain when weighed against product quality didn't seem justified. At the present time we are using the solid pomace remaining in the jelly bag for either a mulch or deer feed. I would reasonably expect, however, that in the future, as our jam production increases, we will be able to use this pomace in some combination with pomace that does not have the juice removed to make the apple jam without sacraficing the quality of the jam.

Esentially we are using the juice from cooked pomace to provide the pectin to make jams and jellies from other fruit we grow. On a simple 1:1 basis we are making raspberry jelly and current jelly, i.e., one part raspberry juice and one part apple juice. The pectin from the fruit itself, plus the pectin rich apple juice, is sufficient to allow the product to jell without the use of purchased commercial pectin. We are also using the cooked apple juice to provide the necessary pectin for raspberry and cherry jam. For all of these products we are able to reduce the sugar amounts called for in standard recipes by substituting the fructose found in the juice of the frozen pomace as it begins to thaw. (This was explained in the apple jam recipe.)

I might note here that the idea of using the natural apple fructose sugar came from observing frozen apple cider as it first begins to thaw. We went through all kinds of complicated formats to precipitate fructose until we found that the simple way was merely to capture the juice from frozen pomace as it began to thaw.

A BRIEF SUMMARY OF PRODUCTION COSTS AND MARKETING INFORMATION TO DATE

The batch recipe detailed using 210 pounds of pomace, approximately six and one quarter bushels of apples, makes fifteen cases of apple jam. At present we are packing one dozen 16 ounce jar cases.

The purchased material costs (jars, caps, labels and condiments) for fifteen completed cases is $112.36. The wholesale valuation of fifteen cases is $244.50 and the orchard retail value is $342.00. The net effect of this is that, excluding labor costs, we are adding $21.14 to the value of each bushel of cider apples at wholesale and $36.74 at retail. At the present time I can't accurately determine labor costs because the production runs so far have been done on a trial basis. From the experience we have had, however, I anticipate labor costs of three-fourths of a manhour per case produced. This seems rather high, but we are doing this without any automated equipment. Another consideration that will change values is larger quanity purchases of jars and caps. So far we have only purchased single pallet lots through a distributor. Multiple pallet direct purchases should reduce these costs by 25%. The final result of this endevor is accomplishing an add-on value for each bushel of apples used to make apple cider which is the objective of the project.

So far our only marketing experience with the new products has been in conjunction with our existing products through outlets already open to us. The results have been very gratifying, that is the almost 200 cases produced have been distributed or sold. From a marketing stand point this has been too easy since our name at these markets was already established. The test will come when we attempt to go into new markets this fall.

It is these new market attempts and a complete production cost analysis that will be covered in the proposed addendum to this final report.

SUMMARY OF HOW THE ADD GRANT MADE THE NEW PRODUCTS A REALITY

When I applied for this project grant I had an idea that I thought would work, but I had no real notion of the difficulty I would encounter obtaining information and sources to sucessfully put the project together. For a period of three years I had attempted to begin work on this project by myself, but I never had the resources available. From what I know now, even if I had limited resources available, I would never have been able to accomplish the project. As a 5Ø-5Ø partner the grant provided the wherewithal to go about the project on a professional basis so we have the satisfaction of knowing that the final products are not only something we can be proud of, but somewhat unique and very marketable.

GRANT BUDGET ITEMS

FOOD LABRATORY

The first step in the project was contracting with a food laboratory to determine if our raw material could be made into a fruit butter or preserve of some kind. The lab developed a series of recipes and then from one of the recipes we selected made an apple butter product for us to test market. I and an employee traveled to the lab site for a hands on experience to see just how our raw product should be cooked and what is necessary to safely and successfully put it into the jar. Along with the laboratory employees we made 12Ø cases of apple butter and then marketed this through outlets that feature our other products. As it turns out we arn't using the lab's recipes for our final products, nor are we following the process steps just as they did them. The equipment we are leasing is more specialized for the single type of product we are making than that which they used. Contracting with a food lab, our largest single expense, was justified by the professional procedure and equipment knowledge provided. Essentially the lab provided a starting point so we would have the ability to proceed on our own with a series of product experiments and developments.

SALARIES

The grant assistance was used to share employee wages for the employee assisting me when test batches or test production runs were attempted or made. These test runs were quite time consuming so I never had more than one employee at a time assisting me.

CONSULTANT
Mr. Thrane, our consultant, involved himself in every phase of our project. We used his knowledge for ingredients, product testing (he took our products into major corporate test facilities for opinions), he provided a continuous series of recipes and lists of ingredient sources. At one point the food lab was quite concerned that the use of apple pomace rather than the whole apple would not allow the apple butter they were producing for us to fit into the FDA guideline definition of a fruit butter. He arranged for a series of correspondence to find an affirmative opinion. We went to him with every problem encountered and if he didn't know the answer he tried to find someone who did. For our purposes the only area of weakness he had was his equipment background was that of a large corporate food processor. The size of our operation requires the equivelent type of equipment but on a much much smaller scale. He was able, however, to arrange our specialized equipment lease of used equipment. He has additionally agreed to monitor the marketing efforts that will be starting this fall.

TRAVEL/PHONE
The only travel expense was the trip with our raw materials to the food laboratory in Skokie, Illinois when the first run of apple butter was made. The telephone was our lifeline to information and sources. I ended up conducting a coast to coast four month equipment search that was in progress almost daily.

EQUIPMENT
We were able to lease the three major items of equipment used in the project process. Grant funds were used to pay for 50% of the first year lease expense.

SUPPLIES
Grant funds were used on a 50-50 basis to provide most of the basic ingredients for test batches and test runs. For the majority of the tests I used only small amounts in our home kitchen. Going from small test recipes to larger batches in our orchard facility involved using $30-40 worth of ingredients and often it took a number of batches until we were able to properly process the recipe. Grant funds were also used to share some of the jar, cover and label costs.

PUBLIC INFORMATION
Grant funds were used to share the expense of the first two in-store apple butter product demonstrations. This was done by a profesional demo firm at two seperate locations with the objective of obtaining customer reaction to the product as well as determining if consumers were willing to purchase the product after tasting it. Grant funds were also used to share the expense of the first "new product" announcement ad in the local regional press. Credits have been noted for the ADD Grant Program with all initial publications.

CONCLUSION

The initial employment benefit will be year around employment availability for two employees who now only have five and seven months work perios available for them at the orchard. Some of the after school and weekend school age employees should be able to extend their part-time work beyond the autumn apple harvest time period.

I have a complete file of all correspondence and literature relating to this project which I certainly would be willing to share with anyone contemplating a similar project. In addition I would be most willing to answer any questions that anyone may have. Our consultant has also indicated that any interested parties should not hesitate to contact him regarding this project.

From my point of view this ADD Grant, which I am extremely grateful for, provided me with the knowledge and the ability to increase the value of every bushel of apples used to make apple cider by approximately two and a half times. Putting this knowledge and ability to work is now my sole responsibility.